Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V (OLD) EXAMINATION – WINTER 2020

Subject Code:151002 Date:03/02/2021

Subject Name:Engineering Electromagnetics

Time:10:30 AM TO 12:30 PM Total Marks:56

Instructions:

1. **Attempt any FOUR questions out of EIGHT questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	i) Express point P(-2,6,3) in the cylindrical and spherical co-ordinate system. ii) Explain Dot product and Cross product in brief.	**04** **03**
	(b)	Define Coulomb's law and derive the expression for electric field intensity E due to point charge.	**07**
Q.2	**(a)**	State Gauss's law and derive the Maxwell's first equation. Determine Electric flux density D for spherical Gaussian surface with point charge at the center.	**07**
	(b)	Two dipoles with dipole moments $-5a_z$ nC/m and $9a_z$ nC/m are located at points (0, 0,-2) and (0, 0, 3) respectively. Find the potential at the origin.	**07**
Q.3	**(a)**	Explain Uniqueness theorem in detail.	**07**
	(b)	Derive an expression for the capacitance of spherical capacitor.	**07**
Q.4	**(a)**	State and derive Biot-Savart's Law.	**07**
	(b)	Explain Maxwell's equations in Point and Integral Form.	**07**
Q.5	**(a)**	Explain how plane wave moves in free space with help of the neat diagram.	**07**
	(b)	Derive magnetic boundary conditions for B and H between two magnetic mediums.	**07**
Q.6	**(a)**	Derive the expression of the Poynting vector.	**07**
	(b)	Generate the expression for Continuity of current.	**07**
Q.7	**(a)**	Derive magnetic dipole moment for the rectangular planar loop in a uniform magnetic field.	**07**
	(b)	A cylindrical capacitor has radii a= 1cm. and b=2.5 cm. If the space between the plates is filled with an inhomogeneous dielectric with $\varepsilon_r = (10 + \rho)/\rho$, where ρ is in centimeters, find the capacitance per meter of the capacitor.	**07**
Q.8	**(a)**	Explain Faraday's law with neat diagram.	**07**
	(b)	For a vector field A show that, the divergence of the curl of A is zero.	**07**

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